BDCP Conservation Strategy Subgroup Handout Working Draft CSA Effects on Stressors March 5, 2007

Potential Relationship between Preliminary Conceptual Conservation Strategy Alternatives and Key Environmental Stressors affecting Covered Species

| Conservation | Entrainment | Upstream | Delta In-Flow | Extent and | Fluctuating | Invasive | Water | Fish Harvest | Barrier | Urban |
|----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Strategy | Entramment | Flow-Related | Detta III-Fiow | Quality of | Salinity | species | Quality | risii iiai vest | Passage | Development |
| Alternative | | Flow-Related | | Habitat | Samily | species | Quanty | | 1 assage | Development |
| CSA 1— | Removal, | Reoperation of | Reoperation of | Limited | Not addressed. | Not addressed. | Not addressed. | Not addressed. | Not addressed. | Not addressed. |
| Operations | consolidation, | upstream | upstream | opportunistic | | | | | | |
| Modifications | and screening | storage | storage | restoration of | | | | | | |
| with Existing | of diversions | facilities to | facilities to | in-channel | | | | | | |
| Conveyance | | improve flow- | improve Delta | habitats for | | | | | | |
| Configuration | Facility and | related habitat | in-flows for | key aquatic | | | | | | |
| | salvage | conditions for | benefit of key | species in the | | | | | | |
| | improvements | key riverine | species | Delta | | | | | | |
| | • | species | • | | | | | | | |
| | Re-operation | - | | | | | | | | |
| | of pumps to | | | ` | | | | | | |
| | reduce | | | | | | | | | |
| | entrainment | | | | | | | | | |
| CSA 2—In- | Not addressed. | Not addressed. | Not addressed. | Substantial | Not addressed. | Adverse | Conversion of | Not addressed. | Not addressed. | Conversion of |
| Delta Habitat | | | | increase in | | effects of | farmland to | | | farmland to |
| Restoration | | | | floodplain | | invasive | habitat would | | | habitat would |
| under Existing | | | | habitat extent | | species on key | reduce | | | preclude future |
| Operations | | | | and quality in | | aquatic species | loadings of | | | urban |
| | | | | northern and | | could be | agricultural- | | | development |
| | | | | eastern Delta | | lessened with | related | | | on those lands |
| | | | | for key species | | habitat | chemicals | | | |
| | | | | | | improvements | discharged | | | |
| | | | | | * | | from islands | | | |
| | | | | | | | into the Delta | | | |

| Conservation Strategy | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|--------------------------|-----------------|--------------------------|---------------|-----------------------|-------------------------|------------------|------------------|----------------|--------------------|----------------------|
| Alternative | | | | Habitat | | | | | | |
| CSA 3— | Reduction in | Possible | Provides for | Substantial | Limiting | Adverse | Conversion of | Not addressed. | Not addressed. | Conversion of |
| Opportunistic | entrainment of | benefits if | more natural | increase in | pumping to | effects of | farmland to | | | farmland to |
| Exports with In- | key species by | limiting | Delta in-flow | floodplain | high flow | invasive | habitat would | | | habitat would |
| Delta Habitat | limiting | pumping to | conditions | habitat extent | periods will | species on key | reduce | | | preclude future |
| Restoration | pumping to | high flow | | and quality | allow for | aquatic species | loadings of | | | urban |
| | high flow | periods | | primarily in | fluctuating | could be | agricultural- | | | development |
| | periods | provides | | northern and | salinity | lessened with | related | | | on those lands |
| | | flexibility to | | eastern Delta | conditions | habitat | chemicals | | | |
| | Reoperation of | provide for | | for key species | during lower | improvements | discharged | | | |
| | DCC to reduce | reoperation of | | | flow periods | | from islands | | | |
| | entrainment of | upstream | | | | Restoration of | into the Delta | | | |
| | key fish | storage | | | | fluctuating | | | | |
| | species into | facilities to | | | | salinity could | | | | |
| | the central and | improve flow- | | | | reduce the | | | | |
| | south Delta | related habitat | | | | extent and | | | | |
| | | conditions for | | | | quality of | | | | |
| | | key riverine | | | | habitats for | | | | |
| | | species | | | | invasive | | | | |
| | | | | | | predator and | | | | |
| | | | | | | competitor | | | | |
| | | | | | | species | | | | |



| Conservation Strategy | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|--------------------------|----------------|--------------------------|----------------|-----------------------|-------------------------|---------------------|------------------|----------------|--------------------|----------------------|
| Alternative | | | | Habitat | | • | | | 9 | • |
| CSA 4—South | Not addressed. | Reoperation of | Reoperation of | Substantial | Eliminating | Adverse | Conversion of | Not addressed. | Not addressed. | Conversion of |
| Delta Aqueduct | | upstream | upstream | increase in | north-south in- | effects of | farmland to | | | farmland to |
| (SDA) with In- | | storage | storage | floodplain | Delta | invasive | habitat would | | | habitat would |
| Delta Habitat | | facilities to | facilities to | habitat extent | conveyance to | species on key | reduce | | | preclude future |
| Restoration | | benefit Delta | improve Delta | and quality | pumps will | aquatic species | loadings of | | | urban |
| | | in-flow may | in-flows for | primarily in | provide for | could be | agricultural- | | | development |
| | | improve flow- | benefit of key | northern and | fluctuating | lessened with | related | | | on those lands |
| | | related habitat | species | eastern Delta | salinity | habitat | chemicals | | | |
| | | conditions for | | for key species | conditions in | improvements | discharged | | | |
| | | key riverine | | | northern and | | from islands | | | |
| | | species | | Improved | western Delta; | Restoration of | into the Delta | | | |
| | | | | water quality | south Delta | fluctuating | | | | |
| | | | | conditions for | would be | salinity could | | | | |
| | | | | key species in | maintained as | reduce the | | | | |
| | | | | lower San | stable | extent and | | | | |
| | | | | Joaquin River | freshwater | quality of | | | | |
| | | | | and South | | habitats for | | | | |
| | | | | Delta | | invasive | | | | |
| | | | | | | predator and | | | | |
| | | | | | | competitor | | | | |
| | | | | | | species in | | | | |
| | | | | | | northern and | | | | |
| | | | | | | western Delta | | | | |

| Conservation Strategy Alternative | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of Habitat | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|--|---|--|---|--|--|--|--|----------------|--------------------|--|
| CSA 5— Isolated Facility (IF) with In- Delta Habitat Restoration | Isolation of pumps provides maximum reduction of entrainment in South Delta | Reoperation of upstream storage facilities to benefit Delta in-flow may improve flow-related habitat conditions for key riverine species | Reoperation of upstream storage facilities to improve Delta in-flows for benefit of key species | Substantial increase in floodplain habitat extent and quality throughout Delta for key species | Provides for restoration of historical patterns of fluctuating salinity throughout the Delta | Adverse effects of invasive species on key aquatic species could be lessened with habitat improvements Restoration of fluctuating salinity could reduce the extent and quality of habitats for invasive predator and competitor species in northern and western Delta Isolation of pumps will reduce exposure of key species to predation in south Delta | Conversion of farmland to habitat would reduce loadings of agricultural-related chemicals discharged from islands into the Delta | Not addressed. | Not addressed. | Conversion of farmland to habitat would preclude future urban development on those lands |

| Conservation Strategy | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|---|----------------|--------------------------|----------------|--|-------------------------|--|--|----------------|--------------------|--|
| Alternative CSA 6—Suisun Marsh Habitat Restoration in Combination with In-Delta Restoration | Not addressed. | Not addressed. | Not addressed. | Habitat Substantial increase in floodplain habitat extent and quality in northern and eastern Delta, but of less magnitude than CSA-2, for key species Substantial increase in brackish habitats for key species in Suisun Marsh Improved diversity and distribution of estuarine habitats | Not addressed. | Adverse effects of invasive species on key aquatic species could be lessened with habitat improvements | Conversion of farmland to habitat would reduce loadings of agricultural-related chemicals discharged from islands into the Delta, but of less magnitude than CSA-2 | Not addressed. | Not addressed. | Conversion of farmland to habitat would preclude future urban development on those lands, but of less magnitude than CSA-2 |

| Conservation Strategy | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|--------------------------|--|--------------------------|--|---|-------------------------|---------------------|------------------|----------------|--------------------|----------------------|
| | Screening of river diversions will reduce entrainment of salomonids and other riverine species | | Not addressed, but operations to improve riverine flow conditions could improve Delta in-flow conditions for key species | | | | | Not addressed. | | |
| | | | | rearing habitat conditions for salmonids and other riverine species | | | | | | |

| Conservation | Entrainment | Upstream | Delta In-Flow | Extent and | Fluctuating | Invasive | Water | Fish Harvest | Barrier | Urban |
|--------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-----------------|
| Strategy | | Flow-Related | | Quality of | Salinity | species | Quality | | Passage | Development |
| Alternative | | | | Habitat | | | | | | |
| CSA 8— | Reduction of | Not addressed, | Reoperation of | Substantial | Eliminating | Adverse | Conversion of | Not addressed. | Not addressed. | Conversion of |
| Bifurcated | entrainment | but reoperation | upstream | increase in | north-south | effects of | farmland to | | | farmland to |
| SDA with In- | associated with | of upstream | storage | floodplain | flow to pumps | invasive | habitat would | | | habitat would |
| Delta | partial | storage | facilities to | habitat extent | will provide | species on key | reduce | | | preclude future |
| Restoration | isolation of | facilities to | improve Delta | and quality | for fluctuating | aquatic species | loadings of | | | urban |
| | pumps | benefit Delta | in-flows for | primarily in | salinity | could be | agricultural- | | | development |
| | | in-flow may | benefit of key | northern and | conditions in | lessened with | related | | | on those lands |
| | | improve flow- | species | eastern Delta | northern and | habitat | chemicals | | | |
| | | related habitat | | for key species | western Delta, | improvements | discharged | | | |
| | | conditions for | | | benefits likely | | from islands | | | |
| | | key riverine | | Improved | to be greater | Restoration of | into the Delta | | | |
| | | species | | water quality | than under | fluctuating | | | | |
| | | _ | | conditions for | CSA 4 | salinity could | | | | |
| | | | | key species in | | reduce the | | | | |
| | | | | lower San | | extent and | | | | |
| | | | | Joaquin River | | quality of | | | | |
| | | | | and South | | habitats for | | | | |
| | | | | Delta, but less | | invasive | | | | |
| | | | | than CSA 4 | | predator and | | | | |
| | | | | | | competitor | | | | |
| | | | | | | species in | | | | |
| | | | | | | northern and | | | | |
| | | | | | | western Delta | | | | |



| Conservation Strategy Alternative | Entrainment | Upstream Flow-Related | Delta In-Flow | Extent and Quality of Habitat | Fluctuating Salinity | Invasive species | Water Quality | Fish Harvest | Barrier Passage | Urban Development |
|--|--|---|---|--|--|--|--|----------------|--------------------|--|
| CSA 9—Dual Conveyance with In-Delta Restoration | Reduction of entrainment associated with curtailment of pumping during periods key species are vulnerable to entrainment | Not addressed, but reoperation of upstream storage facilities to benefit Delta in-flow may improve flow-related habitat conditions for key riverine species | Reoperation of upstream storage facilities to improve Delta in-flows for benefit of key species | Substantial increase in floodplain habitat extent and quality throughout Delta for key species | Provides for restoration of historcial patterns of fluctuating salinity throughout the Delta | Adverse effects of invasive species on key aquatic species could be lessened with habitat improvements Restoration of fluctuating salinity could reduce the extent and quality of habitats for invasive predator/comp etater species in northern and western Delta Reduction in exports during periods key species are vulnerable could reduce exposure of key species to predation in south Delta | Conversion of farmland to habitat would reduce loadings of agricultural-related chemicals discharged from islands into the Delta | Not addressed. | Not addressed. | Conversion of farmland to habitat would preclude future urban development on those lands |